



**British  
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL



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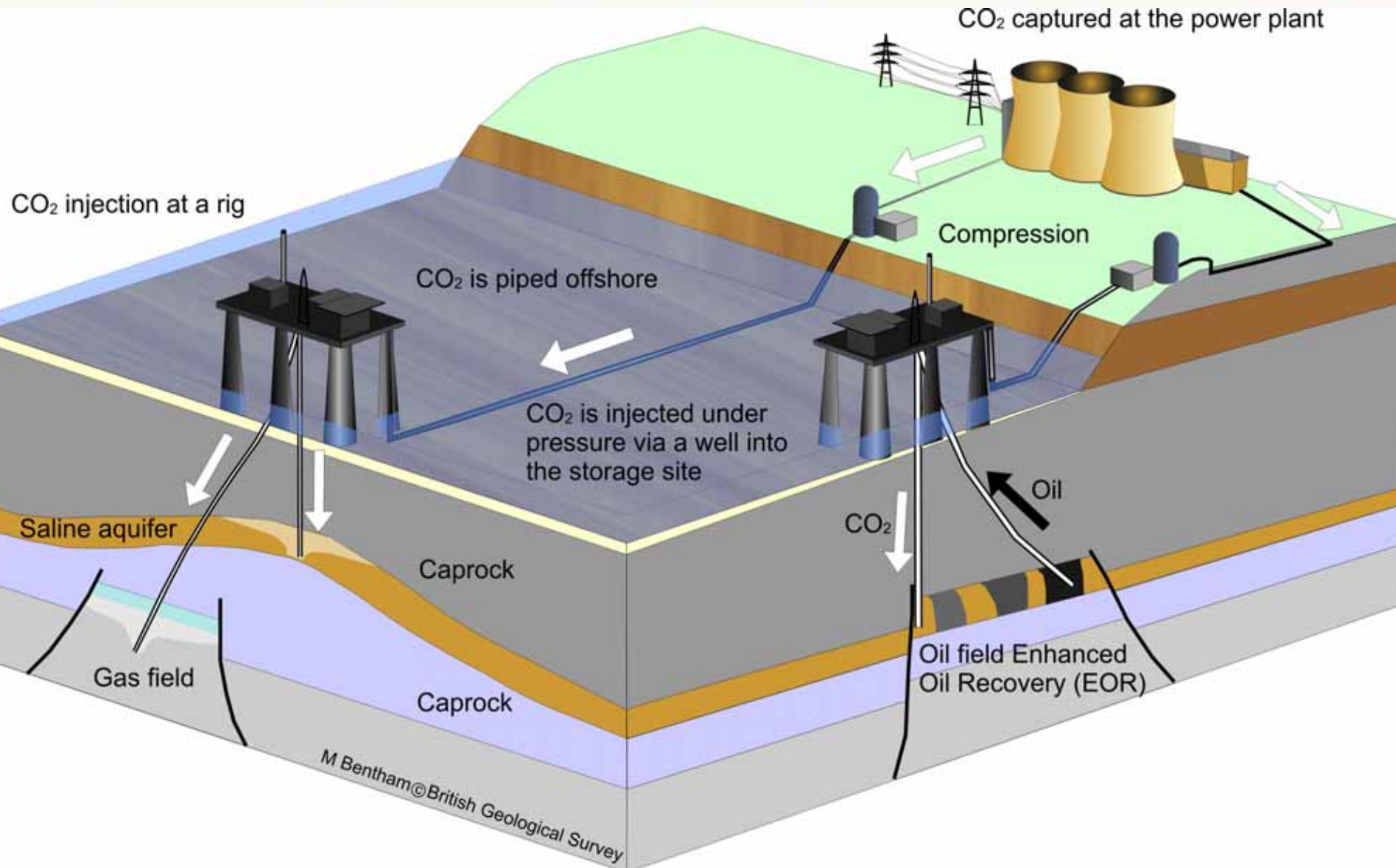
# What is the scope for carbon capture and storage in Northern Ireland

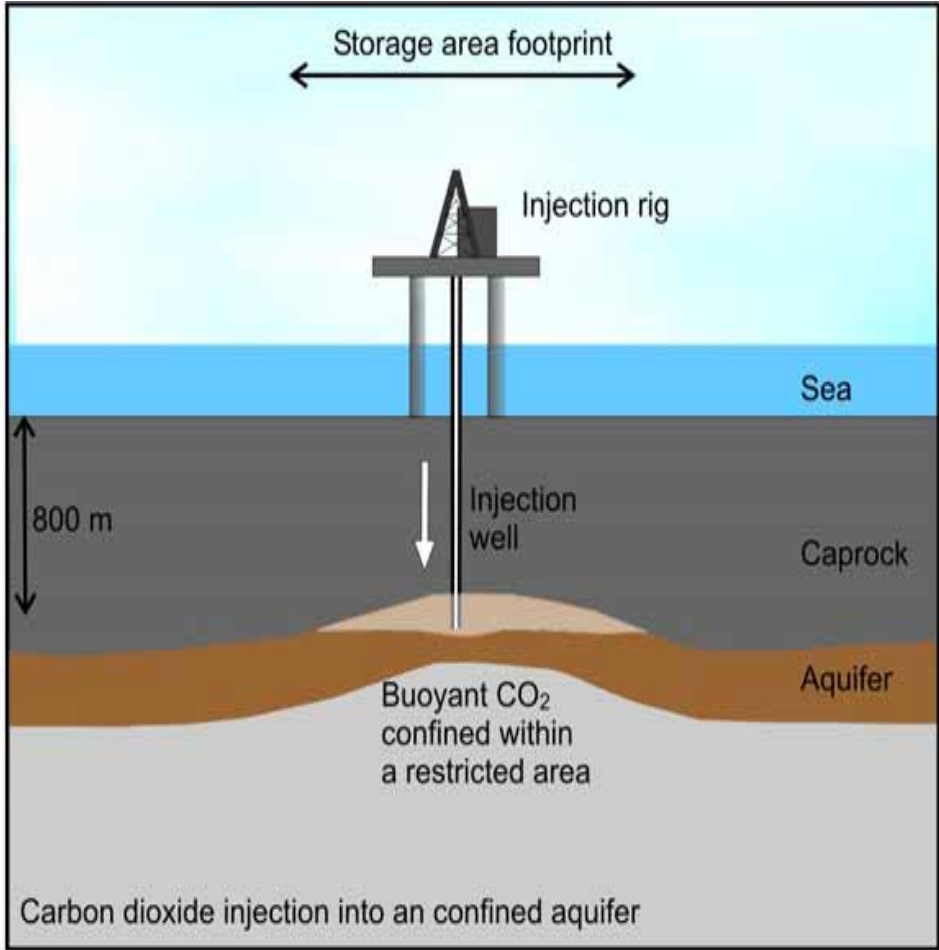
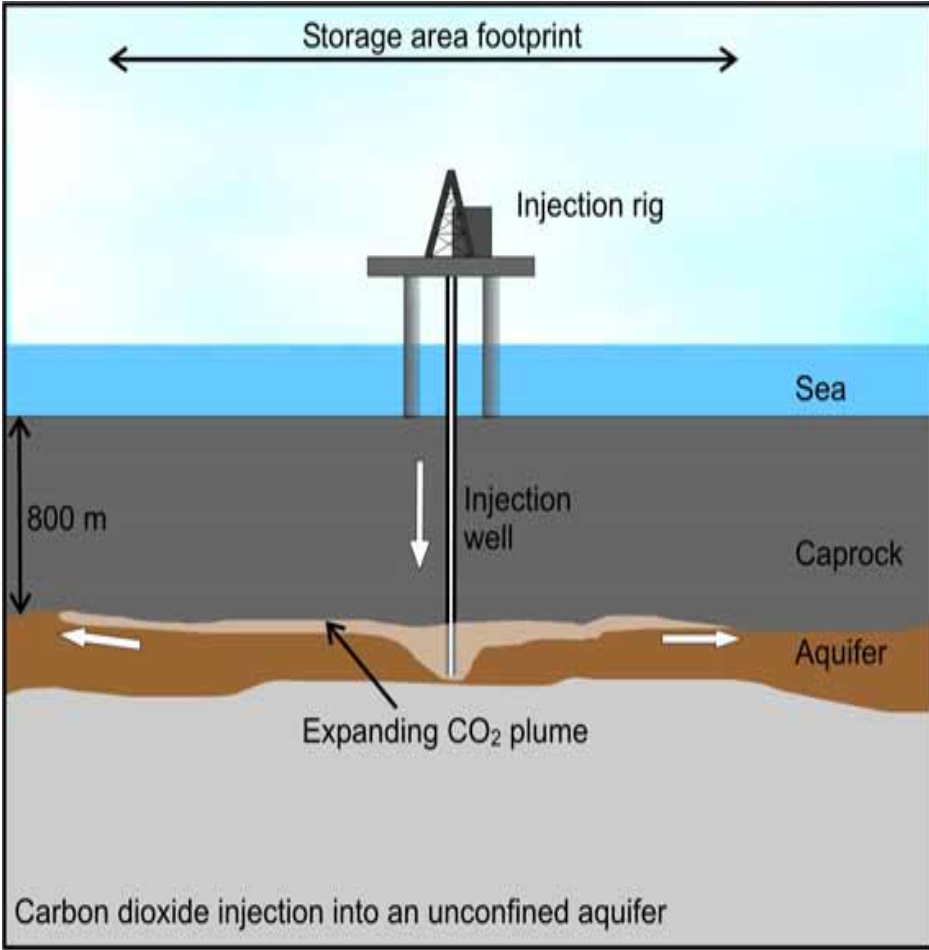
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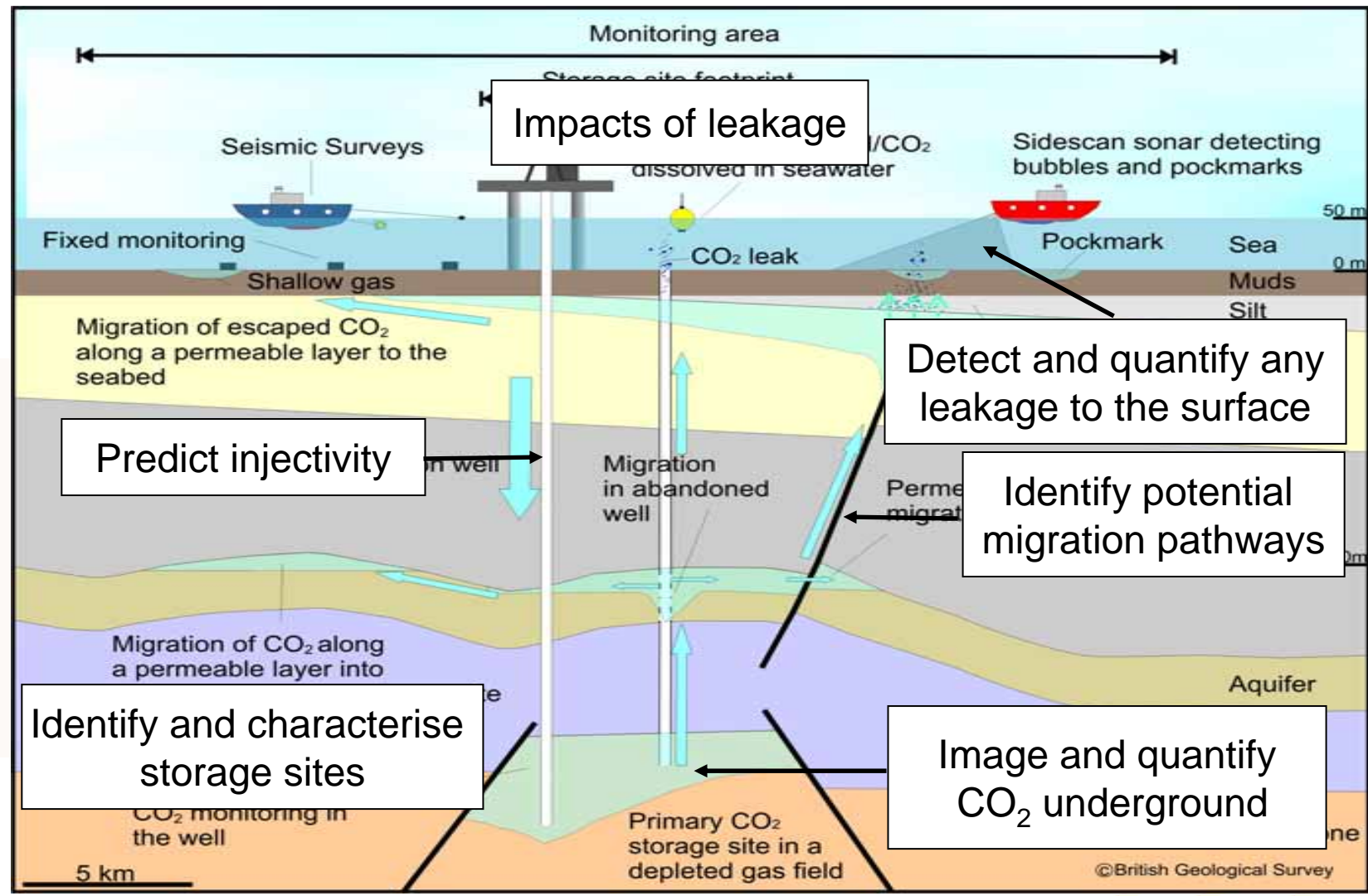
# Geology Suitable for CO<sub>2</sub> storage

- Sedimentary Basins
  - Oil and gas fields
  - Saline aquifers
  - Manmade or natural caverns
  - Un-mineable coal seams





# What we need to know





# Storage in Northern Ireland:

## Assessment of the All Island Potential for Geological Storage of Carbon Dioxide in Ireland.

- 1 year project
- Kick off in May 07
- Geological Assessment – work in progress



## Project Team

- CSA - Project Leaders
- British Geological Survey - **Geological Assessment**
- CO2CRC – Risk Assessment and hydrodynamic modelling
- Byrne Ó Cléirigh – Point source analysis and economic assessment.

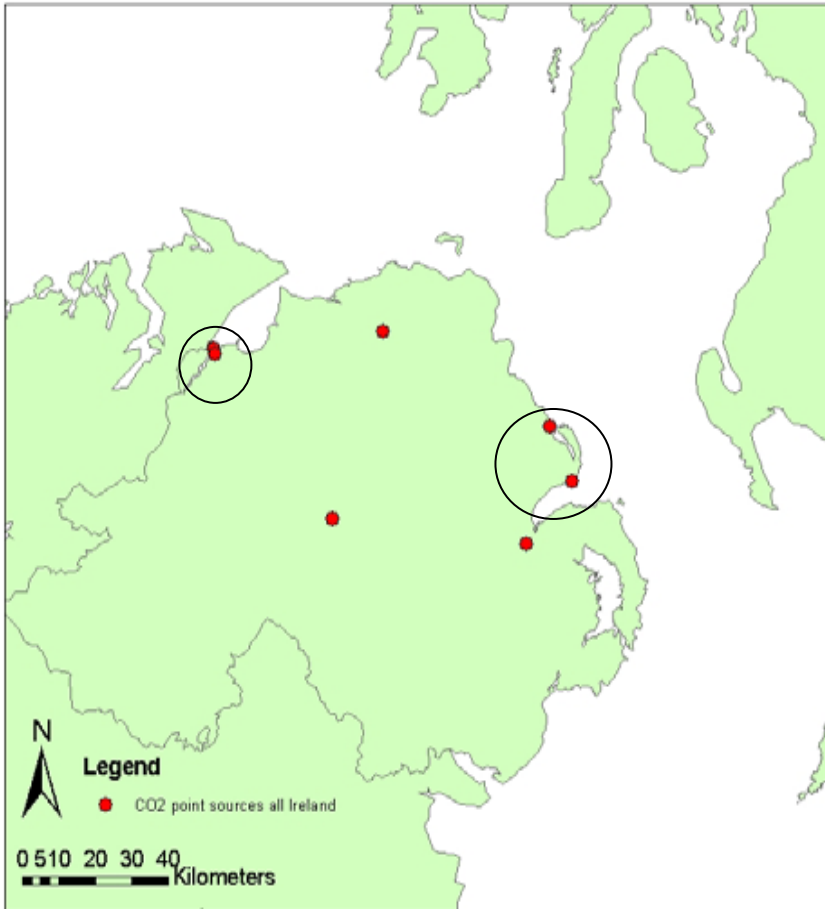
## Steering Committee

- SEI (Sustainable Energy Ireland)
- EPA (Environmental Protection Agency)
- GSI (Geological Survey of Ireland)
- GSNI (Geological Survey of Northern Ireland)
- PAD (Petroleum Affairs Division)





# CO<sub>2</sub> emissions (Point Sources)



- 23 point sources CO<sub>2</sub> each emitting over 100 000 t/yr in all Ireland
- The 3 largest point sources are
  - Premier Power Ltd – 2 Mt/yr
  - AES Kilroot Power –1.6 Mt/yr
  - Coolkerragh Cement -0.7 Mt/yr
- Combined emissions of the point sources close to Belfast are **4.8 Mt /yr**

CSA, Byrne Ó Cléirigh



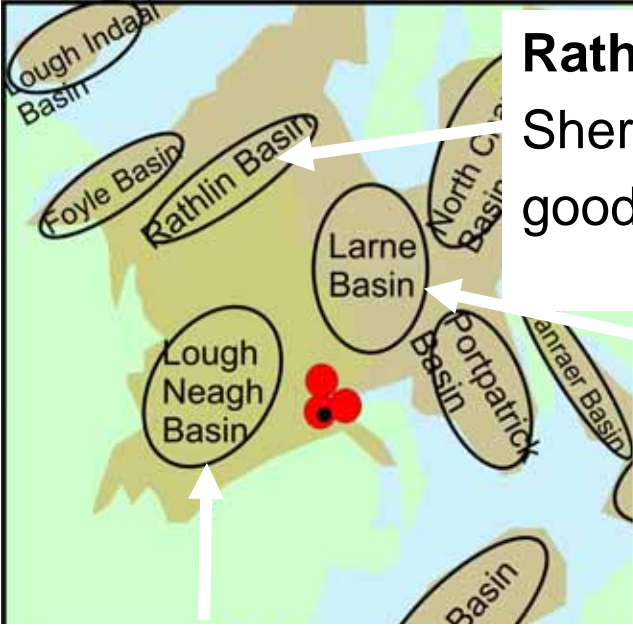


# Regional storage capacity

- Integration of all Irelands data sets from a range of sectors (surveys, oil industry etc)
- Pull together a wide range of data
  - Onshore and Offshore
  - Borehole logs
  - Seismic (Geophysics)
  - Geothermal data
  - Geochemistry
- The Tellus data capable of showing the structural elements both shallow and deep of the rocks.
- Important to understand not just reservoir and cap rock but the whole geological succession.



# Sedimentary Basins



## Rathlin Basin

Sherwood Sandstone  
good porosities.

Permo-Triassic

Sandstone (>3000m)

Low permeability  
Cap rock - evaporites

Salt (Permo-Trias)

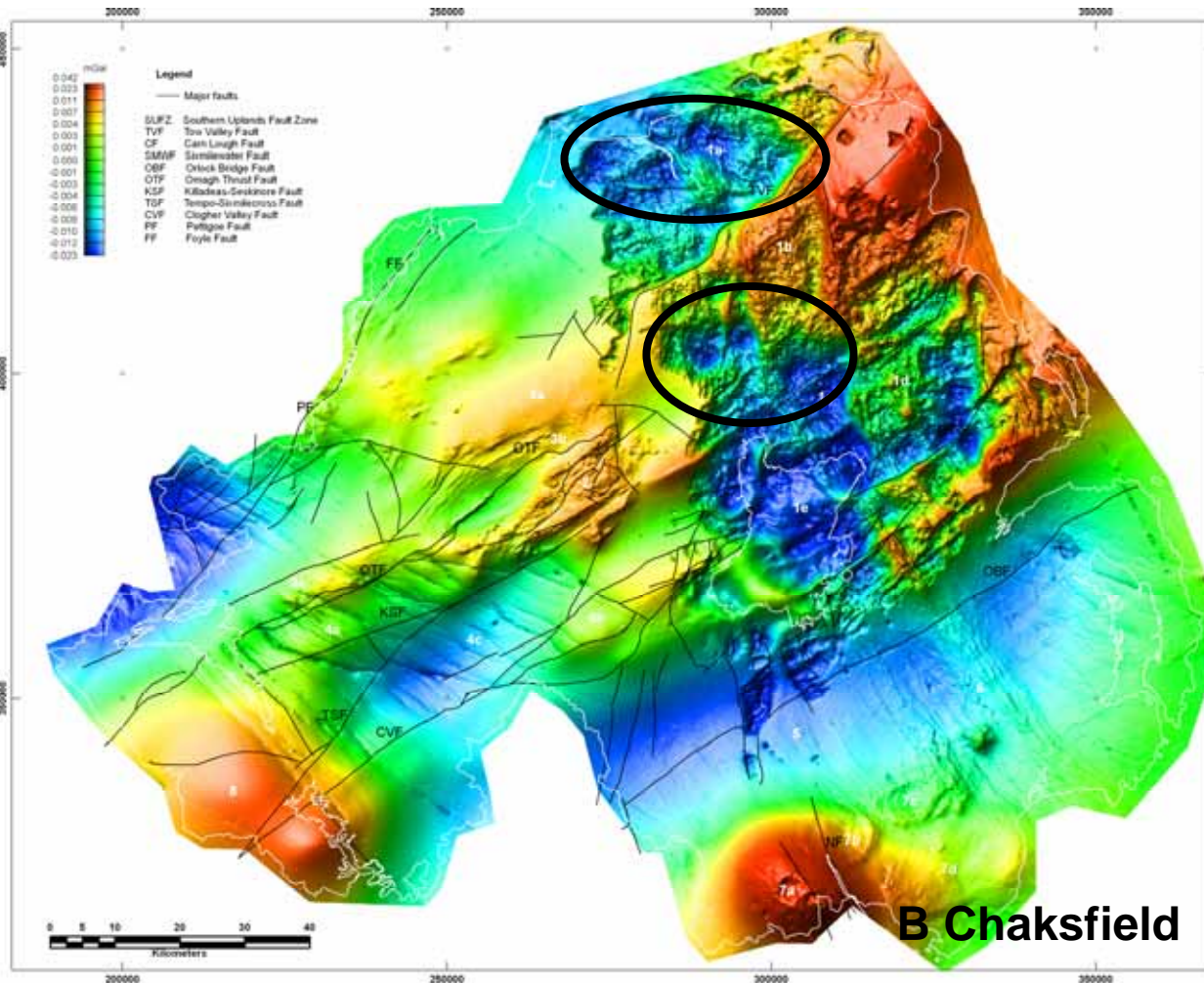
## Lough Neagh Basin

Permian and Sherwood Sandstones  
Cap rock - Mercia Mudstones (thin)





# Example



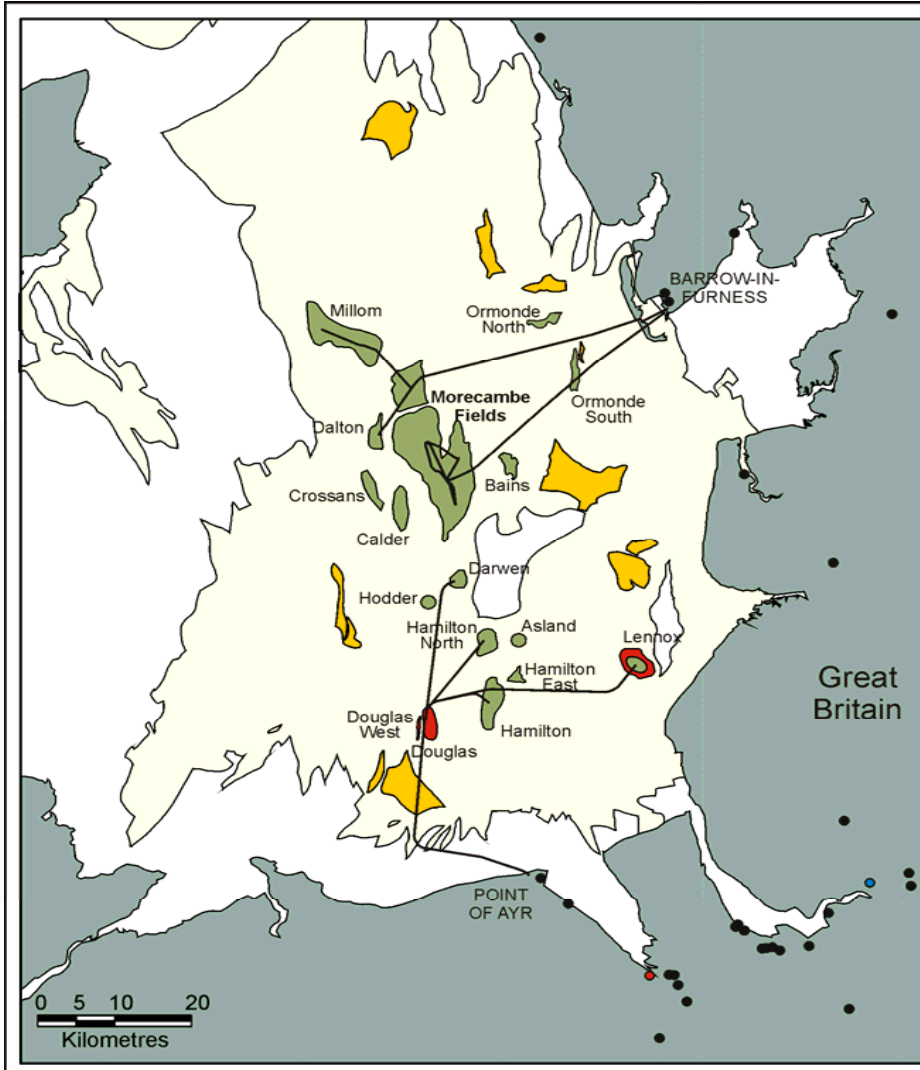
Gravity data has allowed the visualisation of sedimentary basins and structures covered in basalt which may have the potential to store CO<sub>2</sub>.

Imaging under the basalt using seismic data is poor.

Basalt would act a good cap rock to potential reservoir beneath.



# East Irish Sea



## Legend

- Ormskirk Sandstone Formation distribution
- Gas field
- Oil field
- Non-hydrocarbon Structures in the Ormskirk Sandstone
- Connah's Quay power plant
- Fiddlers Ferry power plant
- Other industrial sources of CO<sub>2</sub>
- Existing pipelines

## CO<sub>2</sub> Storage Capacity

Oil & Gas fields  
Estimated max– **1047 Mt**

Ormskirk Closed structures  
Estimated max - **630 Mt**

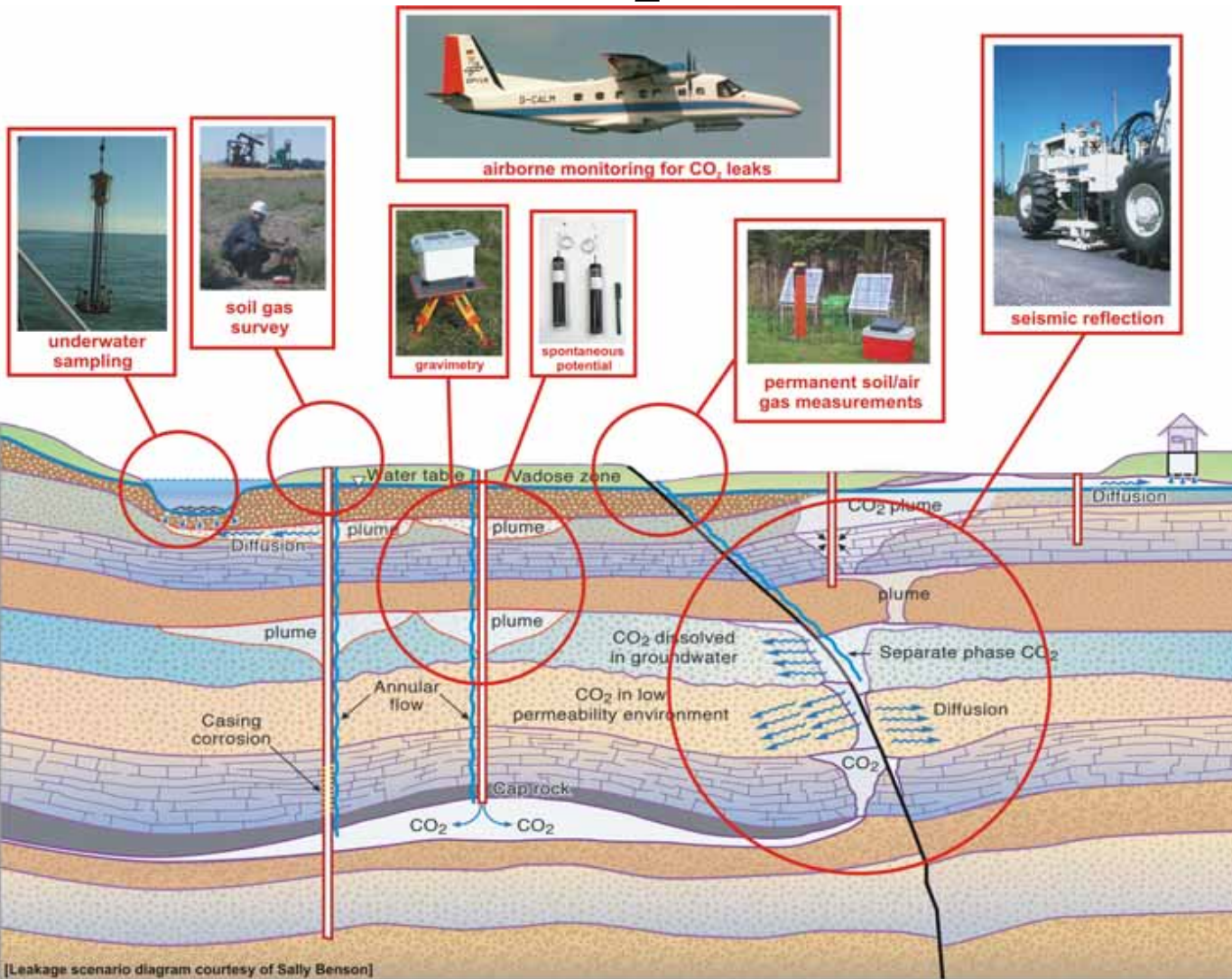


## Storage East Irish Sea

- Largest aquifer closed structure **360 Mt CO<sub>2</sub>**.
- **72 years** worth of storage from Belfast point sources.
- South Morecombe field potential to store **735 Mt CO<sub>2</sub>**
- **147 years** worth of storage from Belfast point sources.
- Smallest aquifer closure could potentially store **7 Mt of CO<sub>2</sub>**



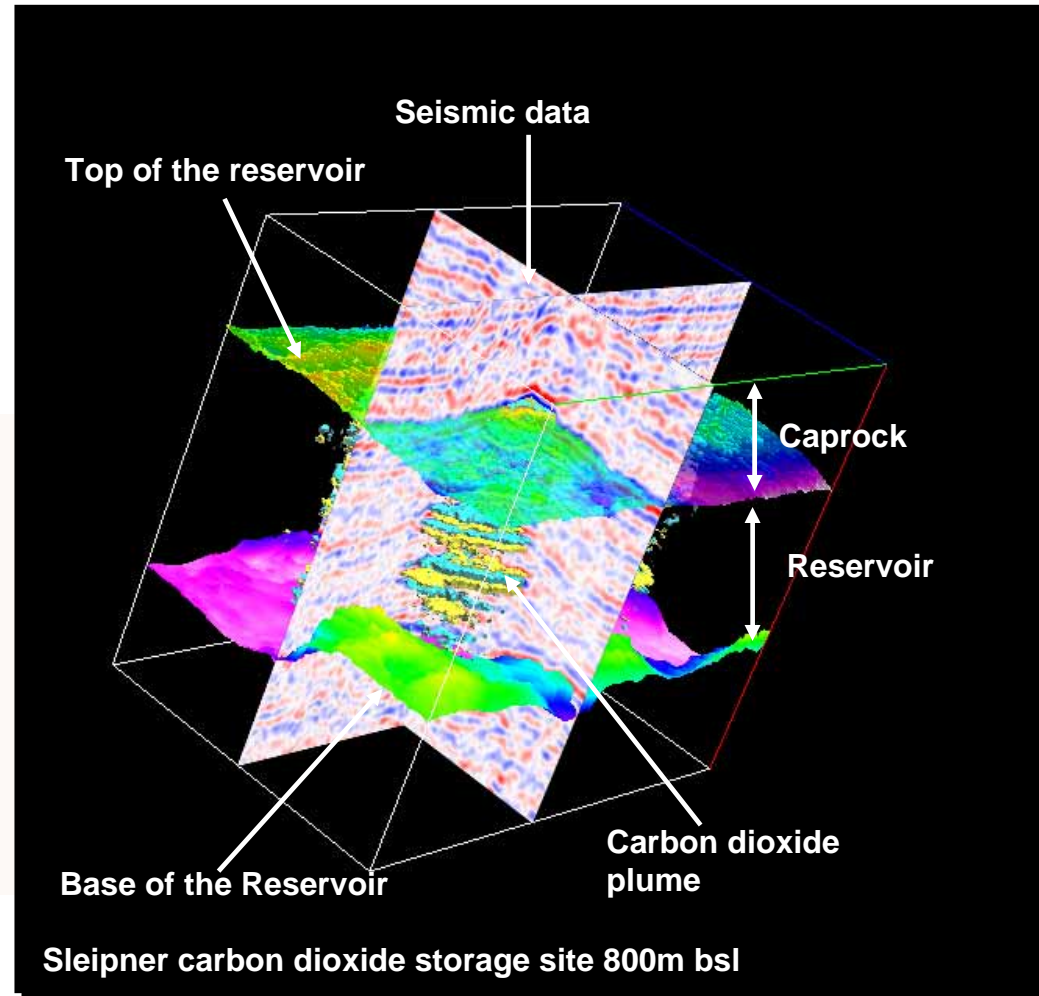
# Monitoring CO<sub>2</sub> underground





# Monitoring and quantification

- For regulation, safety and public confidence we need to know;
  - how much CO<sub>2</sub> is under the ground
  - how it is behaving
  - detect any potential leakage
- Both deep and shallow monitoring tools are important.





# Conclusions

- Geological storage of CO<sub>2</sub> is a potential climate change mitigation option for NI.
- It has the potential to reduce CO<sub>2</sub> emissions as part of a portfolio of measures.
- NI has several sedimentary basins with the potential to store its CO<sub>2</sub> emissions
- National data useful in giving an overview of potential options
- Rigorous data gathering site assessment and characterisation should be undertaken at chosen potential storage sites, this would include an environmental impact assessment